THE KANSAS UNIVERSITY SCIENCE BULLETIN.

Vol. II, No. 15—June, 1904.
(Whole Series, Vol. XII, No. 15.)

CONTENTS:

COAL MEASURE FAUNAL STUDIES, III—LOWER COAL MEASURES,
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PUBLISHED BY THE UNIVERSITY,
LAWRENCE, KAN.

Entered at the post-office in Lawrence as second-class matter.

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COAL MEASURE FAUNAL STUDIES, III.

LOWER COAL MEASURES.

BY J. W. BEEDE AND AUSTIN F. ROGERS.[1]

THE authors are aware that the term "Coal Measures" is becoming obsolete, but, for the sake of uniformity, the title will be continued in this and the succeeding papers. This also is true of certain fossils given in the lists, such as the *Pleurotomarias* and the *Bellerophons*. In the final paper the terminology of the fossils will be carefully brought up to date.

In collecting the material from the Lower Coal Measures the authors, working together, endeavored to collect quantitively the fossils found in the various horizons. The fact that one was interested in the Bryozoa and the smaller crustacea, while the other was more familiar with the other forms, has, we hope, tended to make the results more complete. Aside from this, every effort was made to eliminate the personal equation so far as possible. Particular care was taken not to overlook the commoner forms in order to secure the more rare ones. The latter were, however, industriously sought, but every specimen seen was noted and, whenever possible, was taken. However, these lists are not to be looked upon as complete, for the faunas of each horizon will be very materially increased by prolonged and careful collecting. Our collections are sufficiently complete, we believe, to show most of the salient features of the faunas as units. The remaining additions will consist largely of extending the known range of the forms in associated rocks and the discovery of rare and unique species.

In the following lists the usual conventional characters in-

1. The work of the authors in this paper was coordinate and the seniority of authors is without significance.

dicating the relative abundance of specimens are employed,[2] but in the final paper an entirely different and more definite scheme will be followed.

The discussion of the range and distribution of species and other important subjects will be given in the final paper, which will probably follow two other papers on the fauna of the Coal Measures.

Doctor Girty[3] has published lists of fossils assigned to the rocks here under consideration, but no localities from which they were taken are given. For convenience in comparing our lists with his, the species common to both lists will be followed by an asterisk in our list, and those not represented in our list will be given as foot-notes to the list of each horizon. *In no case are his species to be considered as incorporated in our lists.*

For a synopsis of the literature on the Lower Coal Measures the reader is referred to Adams's recent paper,[4] which gives a review of the literature and synonomy of the formations.

The rocks here included under the term "Lower Coal Measures" are the following:

Dudley (Upper Pleasanton) shales.
Altamont (Parsons)[5] limestone.
Bandera (Lower Pleasanton) shales.
Pawnee limestone.
Labette shales.
Fort Scott (Oswego) limestone (Lower, Shales, and Upper).
Cherokee shales.

CHEROKEE SHALES.

The Cherokee shales are from 400 to 500 feet in thickness, heavily coal-bearing, and, on the whole, rather arenaceous, though their texture varies from jet black carbonaceous shales through sandstone to limestone at various places and horizons. Fossils are, as a rule, very rare. We were able to discover few save in the calcareous layers of small extent. These were found at Cherokee, Oswego, and Frontenac. In these layers fossils are abundant. These horizons are all in the upper part of the shales, no fossils having been found in the lower part.

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2. aa = very abundant; a = abundant; c = common. The remainder are indicated by x.

3. Bull. 211, U. S. Geol. Surv., pp. 29-34, 1903.

4. Bull. 211, U. S. Geol. Surv., 1903.

5. The term "Altamont" seems to have been changed arbitrarily to "Parsons," which should not be used.

The localities from which our fossils were taken are the following, which are briefly indicated in the list: (*a*) Coal-shaft one mile southwest of Cherokee, Kan. The fossils are from a calcareous and pyritiferous layer some distance above the coal. (*b*) A limestone lens one-half mile west of Cherokee, northwest of the county high school building and east of the old smelter, on the south (east) bank of the little creek. It is probably four or five feet in thickness, though very poorly exposed. (*c*) North Leavenworth and Riverside coal-shafts, at Leavenworth, Kan., and the Carr coal-shaft at Richardson. The coal mined in these shafts is in the Cherokee shales. (*d*) Coal-shaft one and one-half miles northeast of Frontenac, Kan. The fossils occur in a buff earthy limestone above the coal. (*e*) Strip-pit coal-mine one and one-half miles southeast of Oswego, Kan. Doctor Newlon informed Doctor Rogers when there that this pit was the locality and horizon from which the type specimens of the cephalopods described by Hyatt and listed below were taken. Doctor Newlon collected the cephalopods referred to.

	Cherokee shaft. a.	Cherokee limestone. b.	Leaven-worth. c.	Frontenac. d.	Oswego. e.
Axophyllum sp	x	.....	.....	.....	.....
Axophyllum rude White and St. John,	.....	x	.....	.....	.....
Chætetes milleporaceous Edwards and Haime	.....	x	.....	.....	.....
Lophophyllum profundum (Edwards and Haime)*	.....	.....	x	.....	x
Lophophyllum sp	.....	.....	.....	x	.....
Fistulipora nodulifera Meek	.....	x	.....	.....	.....
Prismopora triangulata White	.....	x	.....	.....	.....
Rhombopora sp	x	x	.....	.....	.....
Ambocœlia planoconvexa (Shumard)	x	x	.....	.....	x
Chonetes granulifer Owen	x	.....	x	.....	.....
Chonetes flemmingi Norwood and Pratten*	.....	x	.....	.....	.....
Chonetes mesolonus Norwood and Pratten*	x	c	x	x	c
Chonetes sp	x	.....	.....	x	.....
Cleiothyris roissyi L'Eveillé	x	x	.....	.....	.....
Crania modesta White and St. John	.....	.....	.....	x	x
Derbya bennetti Hall	.....	x	.....	.....	.....
Derbya crassa (Meek and Hayden)	.....	.....	x	x	.....
Derbya? sp	.....	x	.....	.....	.....
Hustedia mormoni (Marcou)	.....	x	.....	.....	.....
Lingula umbonata Cox	.....	.....	x	.....	.....

	Cherokee shaft. a.	Cherokee limestone. b.	Leavenworth. c.	Frontenac. d.	Oswego. e.
Orbiculoidea missouriensis (Shumard),	x	.....	c	.....	c
Productus cora d'Orbigny	x	x	.....	x	x
Productus longispinus (Sowerby)	.....	c	.....	.....	.....
Productus muricatus Norwood and Pratten*	a	c	a	aa	a
Productus nebrascensis Owen*	x	.....	.....	.....	.....
Productus semireticulatus (Martin)	x	x	x	x	.....
Pugnax utah (Marcou)	.....	.....	x	x	x
Reticularia perplexa (McChesney)	x	a	.....	.....	.....
Seminula argentia (Shepard)*	c	c	x	.....	.....
Spirifer cameratus Morton*	x	x	x	x	.....
Spiriferina kentuckiensis (Shumard)	.....	.....	x	.....	.....
Allorisma costatum Meek and Worthen,	.....	x	.....	.....	.....
Allorisma subcuneatum Meek and Hayden	.....	x	.....	x	.....
Astartella? sp	.....	.....	.....	.....	x
Astartella varica McChesney?	.....	.....	.....	.....	x
Aviculopecten interlineatus Meek and Worthen	.....	x	.....	x	.....
Aviculopecten occidentalis (Shumard)?	x	.....	.....	.....	.....
Aviculopecten rectilaterarius Cox	.....	.....	x	.....	.....
Aviculopecten sp	.....	x	.....	.....	.....
Aviculopecten sp	.....	.....	x	.....	.....
Entolium aviculatum (Swallow)??	.....	x	.....	.....	.....
Macrodon? sp	.....	.....	x	.....	.....
Macrodon tenuistriatus Meek and Worthen?	x	.....	.....	.....	.....
Myalina sp	.....	.....	.....	x	.....
Nucula? sp	x	.....	.....	.....	.....
Nucula ventricosa Hall	.....	.....	x	.....	.....
Nuculana bellistriata attenuata Meek,	.....	.....	x	.....	.....
Pelecypod sp	.....	.....	.....	x	.....
Pelecypod sp	.....	.....	.....	x	.....
Schizodus sp	x	x	.....	.....	.....
Yoldia knoxensis McChesney	.....	.....	x	.....	.....
Aclisina minuta (Stevens)	c	....	.....	.....	.....
Bellerophon carbonaria Cox?	.....	.....	.....	.....	x
Bellerophon montfortianum Norwood and Pratten	.....	.....	.....	.....	x
Bulimorpha inornata (Meek and Worthen)	.....	.....	.....	x	.....
Bulimorpha sp	x	.....	.....	.....	.....
Dentalium sp	.....	.....	x	.....	.....
Gastropod sp	.....	x	.....	.....	.....
Gastropod sp	x	.....	.....	.....	.....
Loxonema sp	x	.....	.....	.....	.....
Loxonema sp	x	.....	.....	.....	.....
Pleurotomaria brazoënsis Shumard	x	.....	.....	.....	.....

	Cherokee shaft. a.	Cherokee limestone. b.	Leavenworth. c.	Frontenac. d.	Oswego. e.
Pleurotomaria scitula Meek and Worthen?	.....	.....	.....	.....	x
Pluerotomaria sp.	.....	.....	x	.....	.....
Pleurotomaria cf. subsinuatum Meek and Worthen	x	.....	.....	.....	.....
Pleurotomaria sphærulata Conrad	x	.....	.....	.....	x
Sphærodoma intercalaris (Meek and Worthen)	.....	.....	.....	.....	x
Sphærodoma sp.	x	.....	.....	.....	.....
Strophostylus nanus (Meek and Worthen)?	.....	.....	.....	x	.....
Asymtoceras newloni Hyatt	.....	.....	.....	.....	x
Cephalopod sp.	.....	.....	x	.....	.....
Domatoceras umbilicatus Hyatt	.....	.....	.....	.....	x
Orthoceras cribosum Geinitz	.....	.....	.....	.....	x
Orthoceras sp.	x	x	.....	.....	.....
Temnocheilus crassus Hyatt	.....	.....	.....	.....	x
Temnocheilus depressus Hyatt	.....	.....	.....	.....	x
Temnocheilus latus Hyatt	.....	.....	.....	.....	x

Doctor Girty (op. cit., p. 29) also accredits *Lingula carbonaria* to this horizon.

FORT SCOTT LIMESTONE.

This term includes three strata, the Lower Fort Scott limestone, as hale bed about seven or eight feet thick, and the Upper Fort Scott limestone. Each of these three strata will be treated separately, beginning with the

Lower Fort Scott Limestone.—A massive, gray, argillaceous limestone about four and one-half feet thick, resting on the Cherokee shales. At Fort Scott it is locally known as the "cement rock," and is extensively used for hydraulic cement. Fossils are fairly well disseminated throughout the mass.

Localities: (*a*) Fort Scott, at the cement works north of the city, across the Marmaton river; in the city, at the cement works just south of the Frisco railroad station, and at quarries about the town. (*b*) At Oswego, Kan., in a railroad cut just east of the Frisco station. (*c*) McCune; railroad cut just east of town.

	Fort Scott. a.	Oswego. b.	McCune. c.
Fusulinella sp	c	c	x
Aulopora? anna Beede?*	x	x	.....
Campophyllum torquium Owen*	x	.....	.....
Chætetes milleporaceous Edwards and Haime	x	a	.....
Lophophyllum profundum (Edwards and Haime)*	x	.....	.....
Syringopora sp	x	x	.....
Archæocidaris sp	.....	x	.....
Fenestella sp	.....	x	.....
Fenestella wortheni Ulrich?	x	.....	.....
Fistulipora nodulifera Meek	x	x	.....
Polypora elliptica Rogers	x	.....	.....
Polypora submarginata Meek?	x	.....	.....
Prismopora triangulata White*	c	c	.....
Rhombopora lepidodendroides Meek	c	.....	.....
Rhombopora sp	x	.....	.....
Septopora sp	x	.....	.....
Stenopora carbonaria (Worthen)	x	.....	.....
Streblotrypa prisca Gabb and Horn	x	.....	.....
Ambocœlia planoconvexa (Shumard)	a	.....	.....
Chonetes flemmingi Norwood and Pratten	c	.....	.....
Chonetes mesolobus Norwood and Pratten*	c	.....	.....
Chonetes sp	.....	.....	x
Chonetes verneuilianus Norwood and Pratten	x	.....	.....
Derbya crassa (Meek and Hayden)	c	.....	.....
Derbya keokuk Hall?	x	.....	.....
Hustedia mormoni (Marcou)	.....	x	.....
Meekella striaticostata (McChesney)*	c	.....	.....
Productus cora d'Orbigny*	x	x	.....
Productus costatus (Sowerby)?	x	.....	.....
Productus longispinus (Sowerby)	a	a	.....
Productus muricatus Norwood and Pratten	a	.....	.....
Productus pertenuis Meek	x	.....	.....
Productus punctatus Martin*	a	a	.....
Productus semireticulatus (Martin)*	c	a	x
Pugnax utah (Marcou)	x	.....	.....
Reticularia perplexa (McChesney)	x	x	.....
Seminula argentia (Shepard)*	c	c	x
Spirifer cameratus Morton*	c	c	.....
Spiriferina kentuckiensis (Shumard)	x	.....	.....
Allorisma subcuneatum Meek and Hayden	c	.....	.....
Aviculopecten carboniferus (Stevens)	.....	x	.....
Aviculopecten providencesis Cox	x	.....	.....
Aviculopecten sp	x	.....	.....
Myalina subquadrata Shumard	x	.....	.....
Pelecypod sp	x	.....	.....
Schizodus harii Miller?	x	.....	.....
Bellerophon bellus Keyes?	x	.....	.....
Bellerophon crassus Meek and Worthen	x	.....	.....

	Fort Scott. a.	Oswego. b.	McCune. c.
Bellerophon sp.	x	.....	.....
Euomphalus sp. cf. subrugosus Meek and Worthen	x	.....	.....
Gastropod sp.	x	.....	.....
Pleurotomaria sp.	x	.....	.....
Sphærodoma ? sp.	x	.....	.....
Straparollus sp.	x	.....	.....
Strophostylus nanus (Meek and Worthen)	x	.....	.....
Ephippoceras divisum White and St. John	.....	x	.....
Orthoceras sp.	x	.....	.....
Phillipsia major Shumard	x	.....	.....
Griffithides scitula (Meek and Worthen)	x	x	.....
Fish spine	x	.....	.....
Fish tooth	x	.....	.....

Girty also refers the following fossils to the horizon, without locality:

Fusulina cylindrica.	Edmondia sp.
Sponge.	Trepospira sphærulata.
Rhipidomella pecosi.	Naticopsis altonensis.
Productus nebrascensis.	Loxonema ? sp.
Allorisma terminale.	

Reference should be made here to Dr. John Bennett's list of fossils from the vicinity of Fort Scott, the fossils of which were collected during his residence there, and the list compiled, referring the species to their exact horizon, for the University Geological Survey.[6]

There are about twenty-eight such species in the list from the Lower Fort Scott limestone.[7]

Shales between the Fort Scott Limestones.—Seven or eight feet of bituminous shale. The extremely calcareous shales at the top were classed in with the limestone above, which accounts for the very few species given here under this head. The bitu-

6. Vol. I, 1896, pp. 286, 287.

7. In order to make the information of this paper as complete as possible, these species are quoted here, all from the vicinity of Fort Scott:

Axophyllum rudis.	Naticopsis ventricosa.
Cyathaxonia distorta.	Pleurotomaria broadheadi.
Chætetes carbonarius.	Pleurotomaria speciosa.
Athyris lamellosa.	Pleurotomaria sphærulata.
Discina nitida.	Pleurotomaria turbiniformis.
Orthis (carbonaria) pecosi.	Conularia crustula.
Productus americana.	Goniatites sp.
Productus nebrascensis.	Nautilus ferratus.
Edmondia aspenwallensis.	Nautilus occidentalis.
Nucula ventricosa.	Orthoceras rushense.
Nuculana bellistriata.	Orthoceras sp.
Bellerophon carbonaria.	Dithyrocaris sp.
Bellerophon montfortianus.	Petrodus occidentalis.
Bellerophon percarinatus.	Scales and dermal plates of fish.

In addition to these, there are several others in his list which may or may not be represented in our list.

minous shales, where we saw them, were nearly non-fossiliferous. The fossils mentioned below were taken from the railroad cut just east of the Frisco depot and at McCune:

Orbiculoidea missouriensis (Shumard)*, common at both localities.
Fish tooth? at Fort Scott.

Girty refers the following (all of which, except *Spirifer cameratus* Morton, are included in our list from the upper limestone) to this horizon:

Axophyllum rude.	Marginifera muricata.
Rhipidomella pecosi.	Spirifer cameratus.
Chonetes mesolobus.	Spiriferina kentuckiensis.
Chonetes flemmingi.	Cleiothyris orbiculatus.

Doctor Bennett gives the following:

Chonetes mesoloba.	Goniatites sp.
Spirifer planoconvexus.	Petrodus occidentalis.
Bellerophon percarinatus.	Scales and dermal plates of fish.
Pleurotomaria broadheadi.	Spines of fish.
Pleurotomaria sphærulata.	

Most of these are also included in our list from the limestone which follows.

Upper Fort Scott Limestone.—A limestone from ten to fourteen feet thick, weathering gray or buff. It is usually rather thinly bedded, and in the upper part unevenly so. It is quite rich in fossils.

Localities at which collections were made: (*a*) Cement works across the Marmaton river, and at the Minden branch Missouri Pacific railroad crossing in the west part of Fort Scott. (*b*) Just east of Santa Fe station at Girard. (*c*) In the road in a ravine two and one-half miles east of Girard. (*d*) McCune, in the edge of town just west of the creamery, railroad cut just east of the station, and two and one-half miles west of town on Mr. Welsh's place (quarry in the yard).

	Fort Scott. a.	Girard. b.	2½ mi. E. Girard. c.	McCune. d.
Fusulinella sp	c	x	c	c
Aulopora sp	.....	x	.....	.....
Axophyllum rude White and St. John*	c	x	x	x
Campophyllum torquium Owen	x	.....	.....	x
Chætetes milleporaceous Edwards and Haime*	aa	.....	a	a
Lophophyllum profundum (Edwards and Haime)	x	.....	.....	x

	Fort Scott. a.	Girard. b.	2½ mi. E. Girard. c.	McCune. d.
Lophophyllum westii Beede	.....	.....	.....	x
Michelinia eugeneæ White	x	.....	.....	.....
Erisocrinus sp	x	.....	.....	.....
Archæocidaris sp	.....	.....	x	.....
Serpula insista White	x	.....	.....	.....
Fenestella limbata Foerste (*?)	x	x	x	x
Fistulipora nodulifera Meek	x	x	x	.....
Pinnatopota whitei Foerste	x	.....	.....	x
Polypora sp.*	x	.....	.....	x
Prismopora triangulata White	c	.....	c	c
Rhombopora delicata Rogers	x	.....	.....	x
Rhombopora lepidodendroides Meek*	.....	.....	.....	x
Stenopora carbonaria Worthen	x	x	x	.....
Thamniscus? sp	x	.....	.....	x
Ambocœlia planoconvexa (Shumard)*	c	.....	.....	x
Chonetes flemmingi Norwood and Pratten*	x	x	x	x
Chonetes mesolobus Norwood and Pratten*	c	.....	.....	c
Cleiothyris roissyi L'Eveillé[8]	x	?	.....	x
Crania modesta White and St. John	x	x	x	x
Derbya bennetti Hall and Clarke	x	.....	.....	.....
Derbya sp	x	.....	.....	.....
Dielesma bovidens (Morton)	x	.....	.....	.....
Hustedia mormoni (Marcou)*	x	x	x	x
Productus auriculatus Swallow?	.....	.....	x	.....
Productus cora d'Orbigny	.....	.....	x	.....
Productus longispinus Sowerby	c	c	c	c
Productus muricatus Norwood and Pratten*	c	.....	.....	c
Productus pertenuis Meek	.....	c	c	x
Pugnax utah (Marcou)	.....	x	x	.....
Reticularia perplexa (McChesney)*	a	c	c	c
Rhipidomella pecosi (Marcou)	x	.....	.....	.....
Seminula argentia (Shepard)*	c	c	c	c
Spirifer sp	x	.....	.....	.....
Spiriferina kentuckiensis (Shumard)	x	.....	.....	x
Strophalosia spondyliformis White and St. John,	.....	x	.....	x
Aviculopecten carboniferus (Stevens)	x	x	x	x
Aviculopecten interlineatus Meek and Worthen,	x	x	.....	x
Conocardium acadianum Dawson	.....	x	.....	x
Conocardium parishi Worthen	x	x	x	x
Edmondia cf. aspenwallensis Meek (* ?)	x	.....	.....	.....
Lima sp	x	.....	.....	.....
Macrodon sp	.....	x	.....	.....
Macrodon tenuistriata Meek?	.....	.....	.....	x
Pelecypod sp	.....	.....	.....	x
Pseudomonotis sp	.....	x	.....	x
Schizodus wheeleri Swallow?	x	.....	.....	.....

8. The identification of this species in this paper is provisional.

	Fort Scott. a.	Girard. b.	2½ mi. E. Girard. c.	McCune. d.
Bulimorpha chrysalis (Meek and Worthen)?	?	x	.....	.....
Bulimorpha sp.	x	.....	.....	.....
Dentalium sp.	.....	x	x	x
Gastropods 2 or 3 indeterminable species.	.....	x	.....	.....
Gastropod sp.	.....	.....	x	x
Platyceras sp.	.....	x	.....	.....
Strophostylus nanus (Meek and Worthen)	?	x	.....	x
Cephalopod sp.	.....	x	x	.....
Gastrioceras? sp.	.....	x	.....	.....
Nautilus planovolvis (Shumard)	x	.....	.....	.....
Cypridella americana Rogers MSS.	c	c	c	c
Cypridina sp.	x	c	x	x
Cypridinella sp.	.....	x	x	x
Cyclus sp.	x	.....	.....	.....
Cyclus packardi Rogers	.....	.....	x	.....
Griffithides scitula (Meek and Worthen)	c	c	c	c
Griffithides sp.	.....	.....	c	.....
Psammodus sp	x	.....	.....	.....

Girty refers the following additional species here without locality:

Fusulina cylindrica.
Syringopora? sp.
Meekella striaticostata.
Productus semireticulatus.
Productus sp.
Productus punctatus.
Marginifera wabashensis.
Cleiothyris orbicularis.
Aviculopecten occidentalis.
Euchondria neglecta.
Ostracoda (probably included in above list).

Doctor Bennett gives twenty-eight species from the Upper Fort Scott limestone, at Fort Scott, about fifteen of which are not mentioned in our list from this horizon.[9]

LABETTE SHALES.

Thirty-five to fifty feet of bituminous, calcareous and arenaceous shales with, locally, some fossils.

Our specimens were taken from practically two localities: (*a*) At Fort Scott, one mile east of the city and one and one-half miles southwest of the city, near the Minden branch of the Missouri Pacific railroad. (*b*) One and one-half miles southwest of Laneville, on Alexander Slain's place.

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9. Zaphrentis gibsoni?
Discina nitida.
Streptorhynchus crassus.
Aviculopecten sp.
Nucula ventricosa.
Nuculana bellistriata.
Bellerophon carbonaria.
Bellerophon percarinatus.
Bellerophon sp.
Euomphalus rugosus.
Loxonema rugosa?.
Loxonema intercalaris.
Naticopsis altonensis.
Pleurotomaria sp.
Goniatites sp.
Scales, dermal plates and spines of fish.

	a. Fort Scott.	b. Laneville.
Lophophyllum sp.*	c	.....
Stenopora carbonaria (Worthen)	x	.....
Amboccœlia planoconvexa (Shumard)	c	.....
Chonetes granulifer Owen?	x	.....
Chonetes mesolobus Norwood and Pratten*	a	x
Derbya crassa (Meek and Hayden)*	a	.....
Orbiculoidea missouriensis (Shumard)	a	a
Productus cora d'Orbigny	c	.....
Productus longispinus Sowerby	c	.....
Productus muricatus Norwood and Pratten	c	.....
Productus nebrascensis Owen	x	.....
Rhipidomella pecosi (Marcou)	.....	x
Seminula argentia (Shepard)	c	c
Astartella sp.	x	.....
Aviculopecten rectilaterarius Cox	.....	x
Edmondia sp.	x	.....
Myalina swallowi McChesney	x	?
Nucula ventricosa Hall*	.....	c
Nuculana bellistriata attenuata Meek	.....	c
Aclisina minuta (Stevens)	.....	x
Pleurotomaria sp.	.....	x

Girty refers *Rhombopora lepidodendroides* to this horizon.

PAWNEE LIMESTONE.

A heavy stratum of limestone thirty-five or more feet in thickness, resting on the Labette shales. The base of the limestone is often a dark buff or even a chocolate-brown color, while the stone above is very much lighter. That part of the layer resting on the browner-colored rock is frequently very coarsely brecciated, the individual fragments frequently reaching an inch or more in diameter. At Farlington this brecciated portion is about ten feet thick. Over the breccia is another massive limestone. Most of our fossils were taken from the lower part of the formation.

The localities were as follows: (*a*) Just north of the National cemetery, southeast of Fort Scott. (*b*) Bridge over Marmaton river, one-half mile south and one and one-half miles west of Marmaton station. (*c*) Farlington, northeast of the station, on the little creek. (*d*) One and one-half miles northwest of Girard, on S. S. Gruber's place. (*e*) One mile southwest of Laneville, on Alexander Slain's place.

	Fort Scott. a.	Marmaton. b.	Farlington. c.	Girard. d.	Laneville. e.
Fusulinella sp	c	c	x	c	a
Amblysiphonella ? Bryozoan ?	x	.....	.....	.....	a
Aulopora sp	.....	x	.....	.....	.....
Axophyllum rude White and St. John,	x	x	x	.....	x
Axophyllum sp	.....	c	c	.....	.....
Campophyllum torquium Owen	.....	.....	x	x	.....
Chætetes milleporaceous (Edwards and Haime)*	a	.....	a	a	.....
Lophophyllum profundum (Edwards and Haime)*	x	c	.....	.....	x
Lophopyllum ? sp*	.....	.....	x	.....	.....
Lophophyllum westii Beede*	.....	a	.....	.....	a
Michelinia eugeneæ White	.....	x	.....	.....	c
Archæocidaris sp	.....	.....	.....	.....	x
Chainodictyon laxum Foerste	x	.....	.....	.....	x
Fenestella limbata Foerste	x	.....	c	x	c
Fenestella sp	.....	.....	x	.....	x
Fistulipora nodulifera Meek	c	c	c	x	c
Pinnatopora sp	c	.....	.....	.....	.....
Pinnatopora whitei Foerste	c	.....	.....	x	.....
Polypora elliptica Rogers	c	.....	.....	.....	c
Polypora sp	.....	.....	.....	.....	x
Prismopora triangulata White	x	.....	x	.....	.....
Rhombocladia delicata Rogers	c	.....	.....	x	c
Rhombopora lepidodendroides Meek	.....	.....	.....	.....	x
Stenopora carbonaria (Worthen)	.....	x	.....	.....	.....
Ambocœlia planoconvexa (Shumard)*,	c	c	c	.....	c
Brachiopod? sp., a bazarre form	.....	.....	.....	.....	c
Brachiopod sp., perhaps a productoid	.....	.....	.....	x	.....
Chonetes flemmingi Norwood and Pratten*	c	x	.....	x	x
Chonetes mesolobus Norwood and Pratten	x	.....	.....	x	x
Cleiothyris roissyi L'Eviellé (*?)	x	a	.....	.....	x
Crania modesta White and St. John	x	.....	x	x	x
Cryptacanthia compacta White and St. John	c	c	.....	.....	.....
Dielasma bovidens (Morton)	.....	x	x	.....	x
Hustedia mormoni (Marcou)*	c	a	c	x	c
Meekella striaticostata (McChesney)	.....	.....	x	.....	.....
Orthotetes sp	.....	.....	x	a	.....
Productus cora d'Orbigny	.....	.....	.....	.....	x
Productus costatus Sowerby	x	.....	x	.....	x
Productus longispinus Sowerby (*?)	c	c	c	x	c
Productus muricatus Norwood and Pratten	x	x	x	.....	.....
Productus pertenuis Meek	x	.....	c	x	x
Productus semireticulatus (Martin)*	.....	.....	c	.....	.....

	Fort Scott. a.	Marmaton. b.	Farlington. c.	Girard. d.	Laneville. e.
Productus sp	.....	x	c	.....	.....
Proboscidella? sp	.....	.....	x	.....	.....
Reticularia perplexa (McChesney *....	a	aa	a	c	a
Rhipidomella pecosi (Marcou)*.....	x	.....	.....	.....	x
Seminula argentia (Shepard)*.....	c	c	a	.....	c
Seminula subquadrata Hall?.....	x	.....	.....	.....	.....
Spirifer cameratus Morton.....	x	x	.....	.....	.....
Spiriferina kentuckiensis (Shumard)..	x	.....	.....	.....	x
Strophalosia spondyliformis (White and St. John).....	.....	.....	c	.....	x
Aviculopecten carboniferus (Stevens),	.....	.....	x	x	.....
Aviculopecten interlineatus Meek and Worthen.....	.....	.....	x	x	.....
Aviculopecten? sp.....	.....	.....	x	x	.....
Clinopistha radiata Hall?.....	.....	.....	.....	.....	x
Conocardium parishi Worthen.....	x	x	x	x	.....
Conocardium sp.....	x	.....	.....	.....	.....
Macrodon sp.....	x	.....	.....	.....	.....
Macrodon? sp.....	x	.....	.....	.....	.....
Myalina swallowi (McChesney).....	.....	.....	x	.....	.....
Pelecypod sp.....	.....	.....	x	.....	.....
Anomphalus sp.....	x	.....	.....	.....	.....
Bellerophon carbonarius Cox.....	.....	x	.....	.....	.....
Bellerophon sp.....	.....	.....	x	.....	.....
Capulus parvus Swallow.....	.....	x	.....	.....	.....
Euomphalus sp (*?).....	.....	.....	x	.....	.....
Gastropod sp.....	x	.....	.....	x	x
Naticopsis sp.....	.....	.....	x	.....	.....
Pleurotomaria missouriensis Swallow..	.....	.....	x	.....	.....
Pleurotomaria sp.....	.....	x	.....	.....	.....
Pleurotomaria tabulata (Conrad).....	x	.....	.....	.....	.....
Straparollus? sp.....	x	.....	x	.....	.....
Cephalopod sp.....	.....	.....	x	.....	x
Orthoceras sp.....	.....	.....	x	.....	.....
Cyclus pyrimidatus Rogers.....	.....	.....	.....	x	.....
Cypridella americana Rogers MSS....	x	.....	x	x	x
Cypridina sp.....	x	.....	x	x	.....
Euotmis curvisulcata Rogers MSS.....	.....	.....	.....	x	.....
Griffithides scitula Meek and Worthen,	.....	.....	.....	.....	x
Fish tooth and spines.....	x	.....	.....	.....	x
Peripristis semicircularis.....	.....	x	.....	.....	.....

Girty also refers *Fusulina cylindrica* and *Syringopora?* sp. to this horizon.

Doctor Bennett (loc. cit.) reports the following additional species from the Pawnee limestone, at Fort Scott:

Zeacrinus mucrospinus.	Naticopsis ventricosa.
Discina nitida.	Pleurotomaria sphærulata.

BANDERA SHALES.

About 100 feet of shales and sandstone flagging. The only fossils seen were crustacean tracks and what appear to be large worm tracks in the flagging in Mr. Gilfillan's quarry west of Redfield.

ALTAMONT (PARSONS) LIMESTONE.

A six- or eight-foot stratum of limestone resting on the Bandera shales. This limestone was very poorly fossiliferous at the localities visited.

The localities were: (*a*) Bed of the Marmaton river a mile east of Uniontown and at Gilfillan. (*b*) Two miles east and a half-mile south of Walnut, in the road by the railroad-crossing.

	Uniontown. a.	Walnut. b.
Fusulinella sp	.....	a
Axophyllum rude White and St. John	x	x
Lophophyllum westii Beede	x	x
Crinoid sp. (* ?)	.....	x
Archæocidaris sp	.....	x
Spirorbis sp	x	.....
Fistulipora nodulifera Meek (* ?)	.....	c
Pinnatopora sp	.....	x
Polypora sp	.....	x
Rhombopora delicata Rogers	.....	c
Ambocœlia planoconvexa (Shumard)*	c	c
Cleiothyris roissyi L'Eveillé*	x	x
Chonetes mesolobus Norwood and Pratten*	.....	x
Cryptacanthia compacta White and St. John	x	.....
Hustedia mormoni (Marcou)*	c	x
Orbiculoidea missouriensis (Shumard)*	a	.....
Orthotetes sp	.....	x
Productus longispinus Sowerby (*?)	a	c
Productus semireticulatus (Martin)*	.....	x
Productus? sp	.....	x
Pugnax utah (Marcou)*	x	.....
Reticularia perplexa (McChesney)*	aa	a
Seminula argentia (Shepard)*	a	c
Spirifer cameratus Morton*	.....	x
Myalina sp	x	.....
Bellerophon sp. (*?)	x	.....
Gastropod sp	x	.....
Strophostylus sp	x	.....
Fish spines and tooth or tubercle	x	.....

Girty's list contains the following additional species, with no locality given:

Sponge?	Pugnax rockymontana.
Lophophyllum proliferum.	Pleurotomaria sp.
Chætetes milleporaceous.	Pleurophorus sp.
Campophyllum sp.	Astartella vera.
Stenopora sp.	Leda bellistriata.
Cladopora sp.	Nucula ventricosa.
Prismopora serrata.	Orthoceras rushense?.
Fenestella sp.	Dentalium? sp.
Chonetes glaber.	Naticopsis sp.
Chonetes flemmingi.	Euomphalus subrugosus.
Derbya crassa.	Phanerotrema grayvillensis.
Dielasma bovidens.	Worthenia tabulata.
Meekella striaticostata.	Trepospira sphærulata.
Productus nebrascensis.	Euphemus carbonarius.
Productus punctatus.	Soleniscus sp.
Spiriferina kentuckiensis.	Bellerophon crassus?.

Doctor Bennett adds *Petrodus occidentalis* to the list from this limestone.

DUDLEY SHALES.

About 159 feet of shales with thin limestones and sandstones. We collected no fossils from these shales.